

Radiance Rendering Acceleration

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Benchmark Setup

Hardware:

CPU: Intel XeonC CPU X5670 @ 4Ghz / 49,152 MB RAM

GPU: EVGA GeForce GTX 980 SC / 4 GB VRAM

Software:

Radiance x64 5.0.a.3 <https://github.com/NREL/Radiance/releases>

Accelerad x64 0.3 (5.0.a.3) <http://web.mit.edu/sustainabledesignlab/projects/Accelerad/>



RPICT Rendering Parameters for ISS Interior

Truth: -lr 9 -lw 0.0005 -ps 1 -pt 0.05 -ss 2 -st 0 -as 256 -dr 3 -dp 1024 -ds 0 -dt 0 -dc 1 -ab 11 -ar 256 -aa 0 -ad 2048

Constant: -lr 7 -lw 1.00e-03 -ps 4 -pt 0.05 -dr 1 -dp 512 -dt 0.05 -dc 0.5

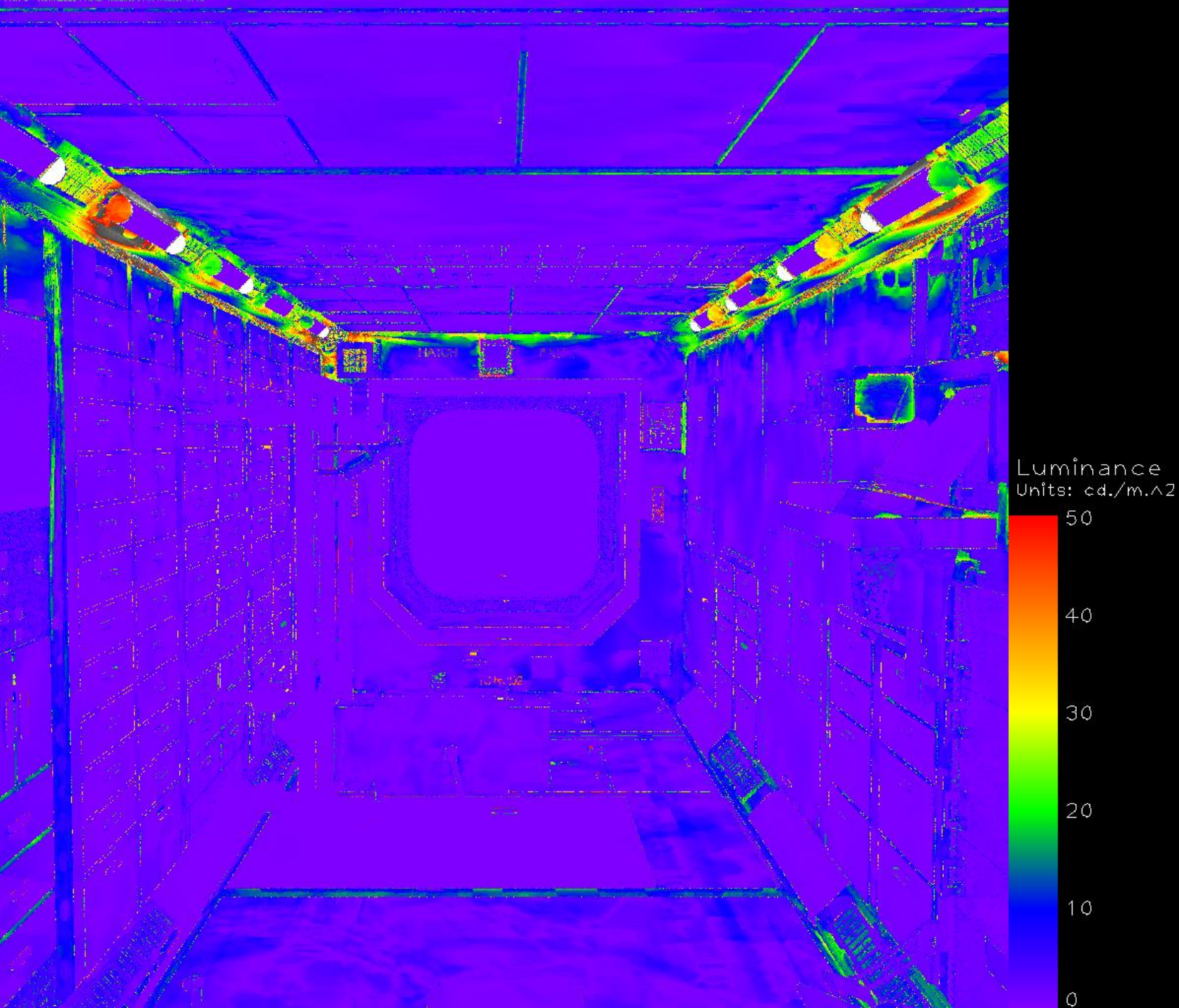
Dynamic (Default): -ab 5 -aa 0.1 -ds 0.1 -st 0.1 -x 1024 -y 1024

Absolute CPU or GPU Error = $\text{abs}(\text{CPU or GPU image} - \text{Truth image})$

Relative Error = $\text{abs}(\text{CPU image} - \text{GPU image})$

Image Resolution VS Computation Time for ISS Interior





**ALL FALSE COLOR IMAGES
shown are Relative Error Images**

Dynamic RPICT Parameters:

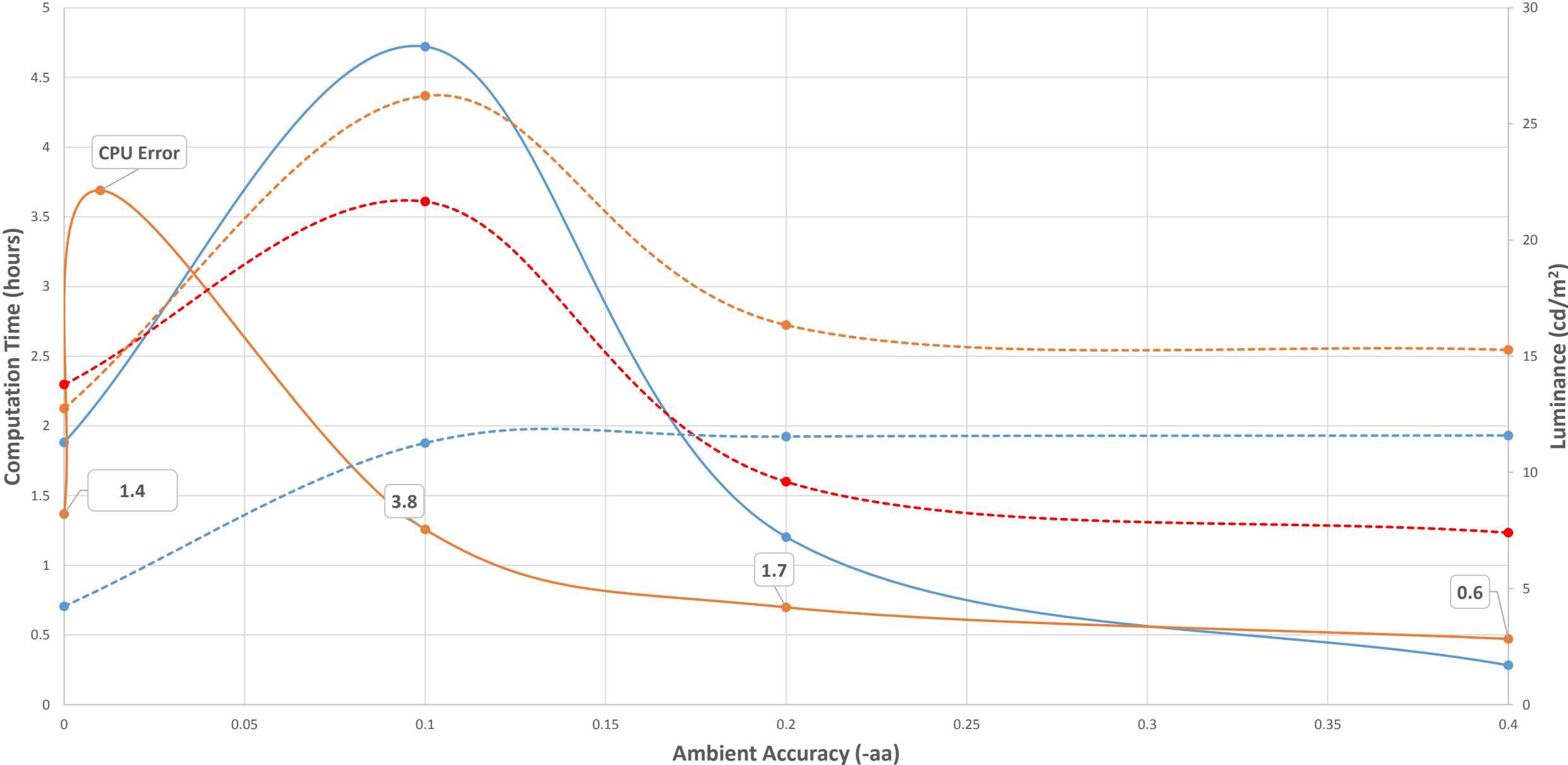
**-ab 5 -aa 0.1 -ds 0.1 -st 0.1 -x 1024 -y
1024**

Average Relative Error = 21.7 cd/m²

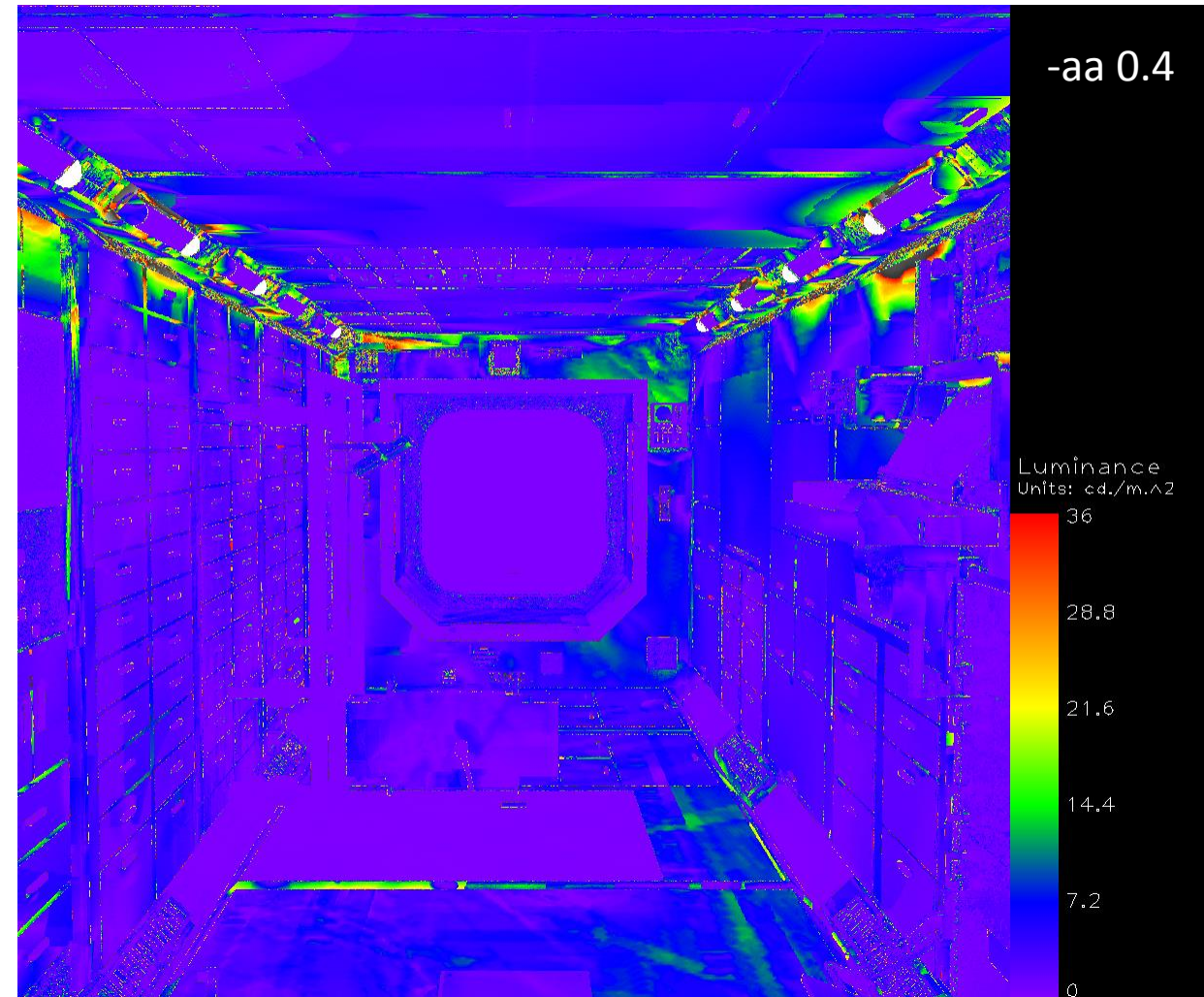
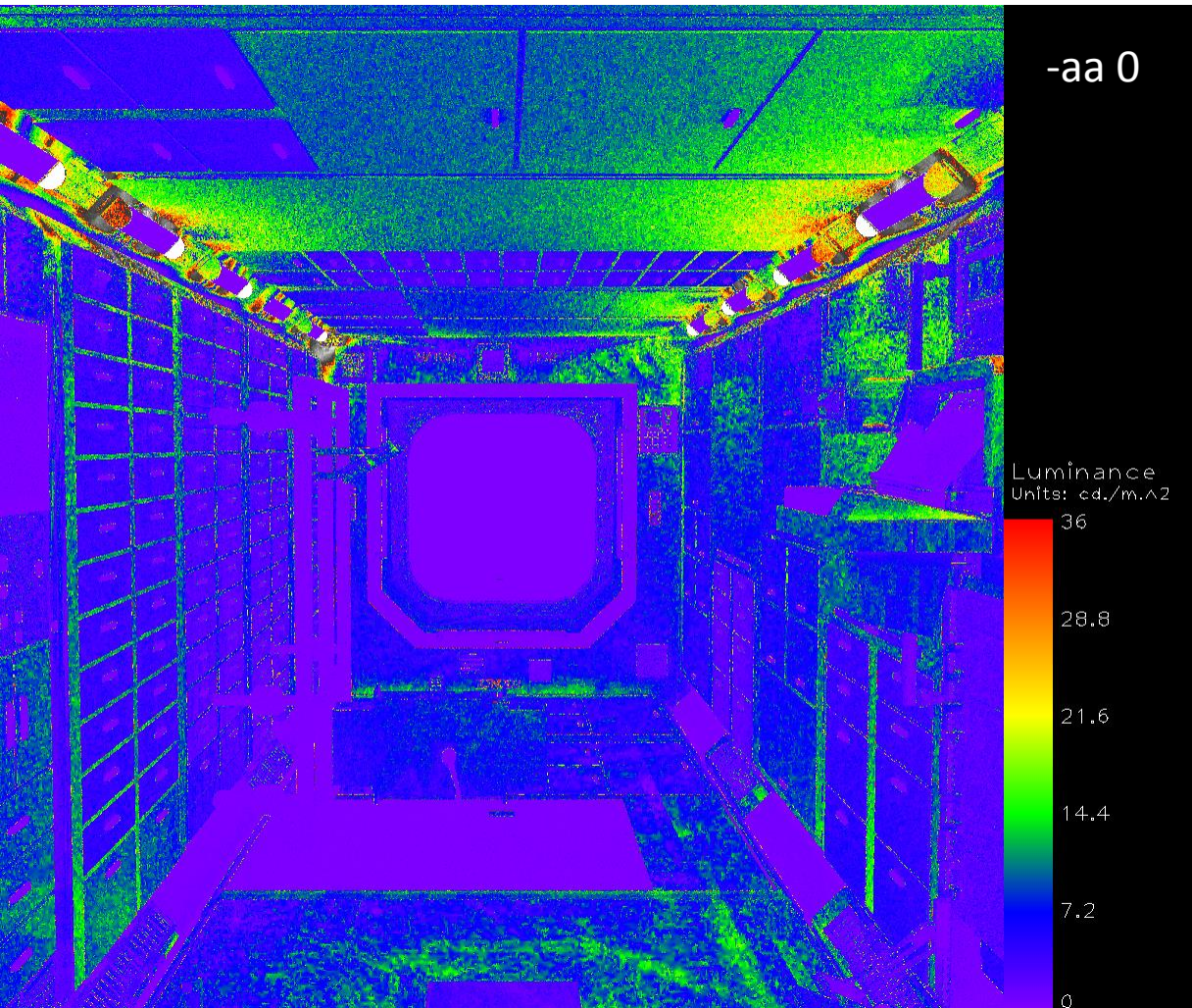
**Error is concentrated around adjacent
surfaces next to light sources.**

Ambient Accuracy VS Computation Time for ISS Interior

CPU Time GPU Time Relative Error CPU Absolute Error GPU Absolute Error

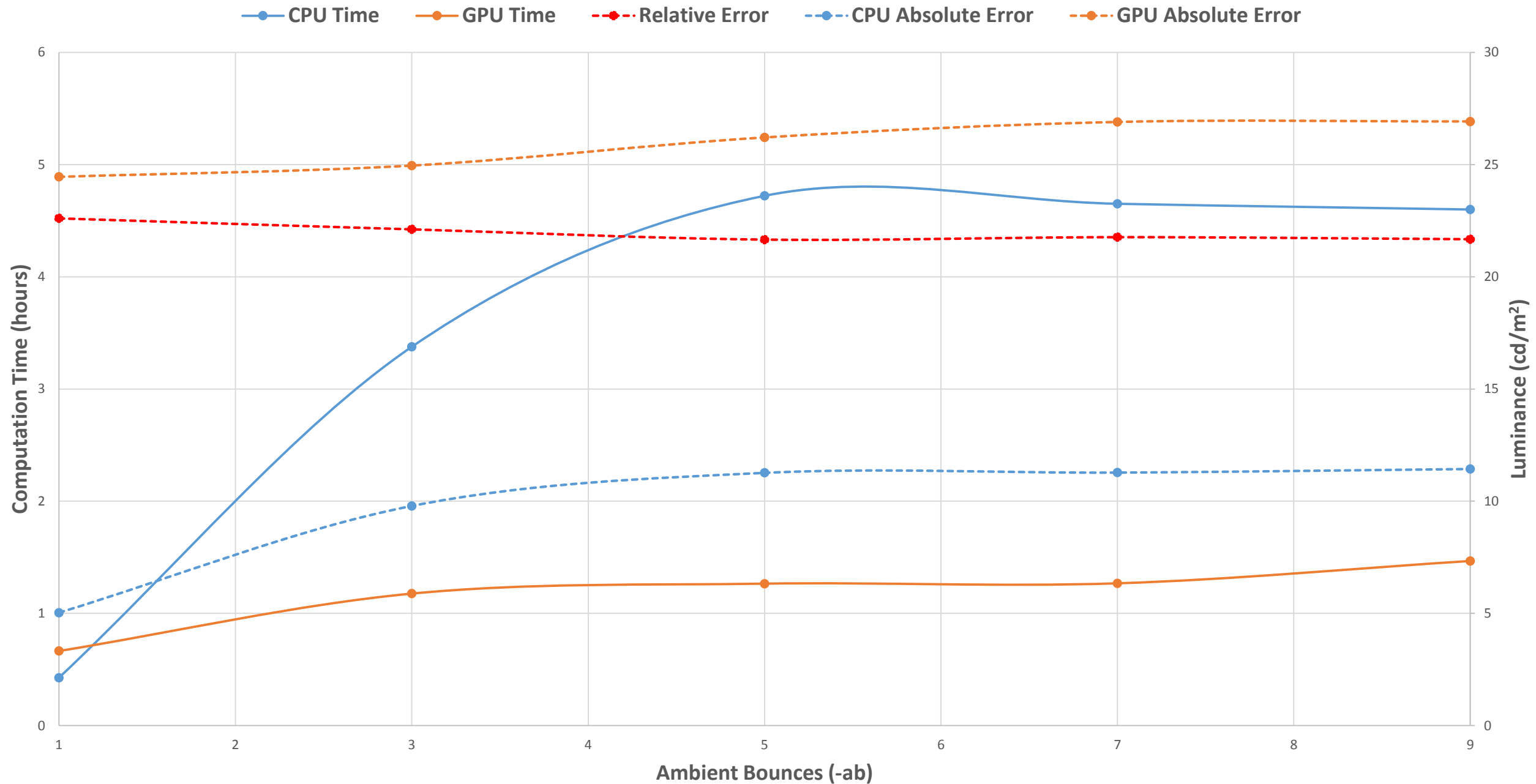


Ambient Accuracy –aa

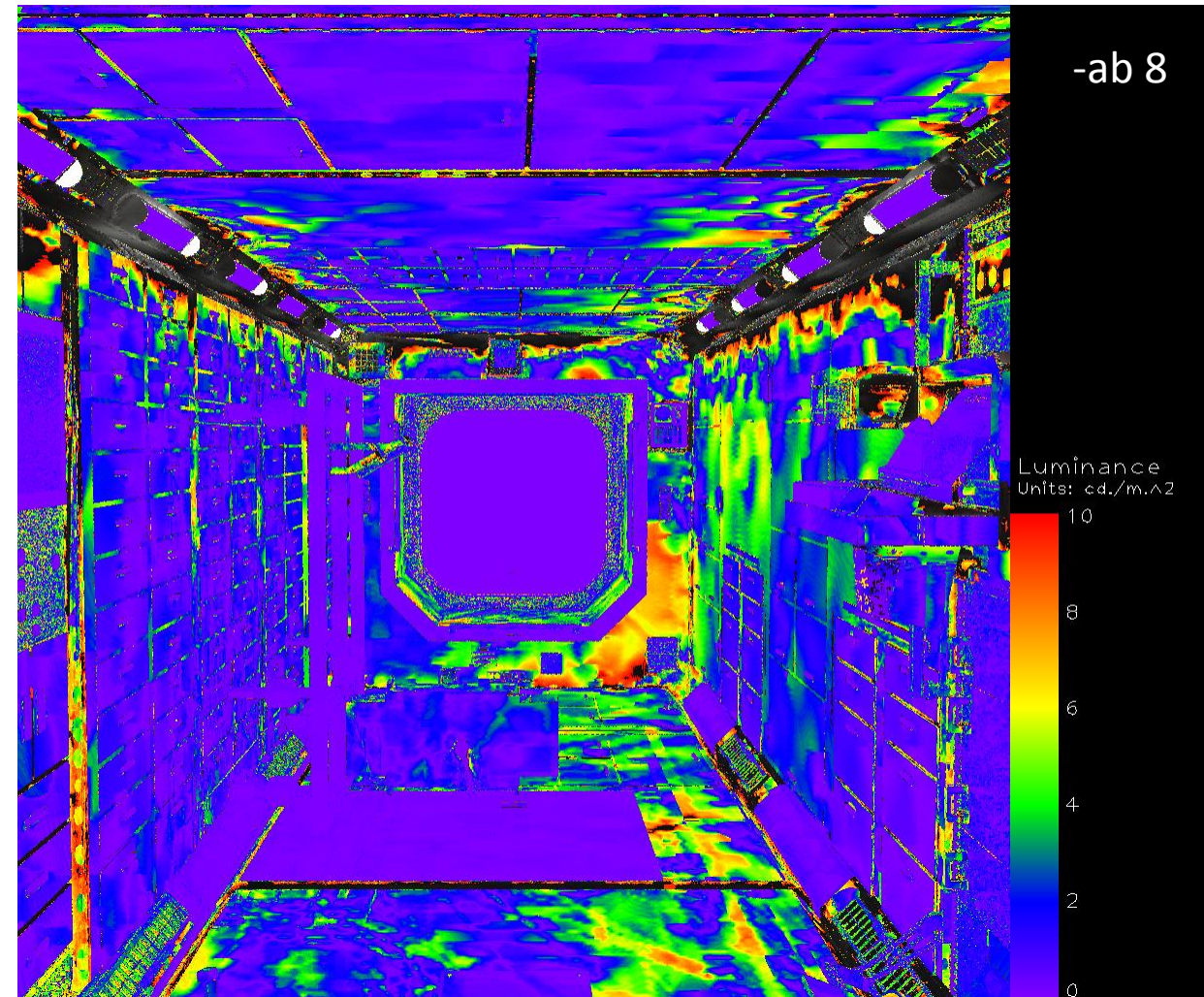
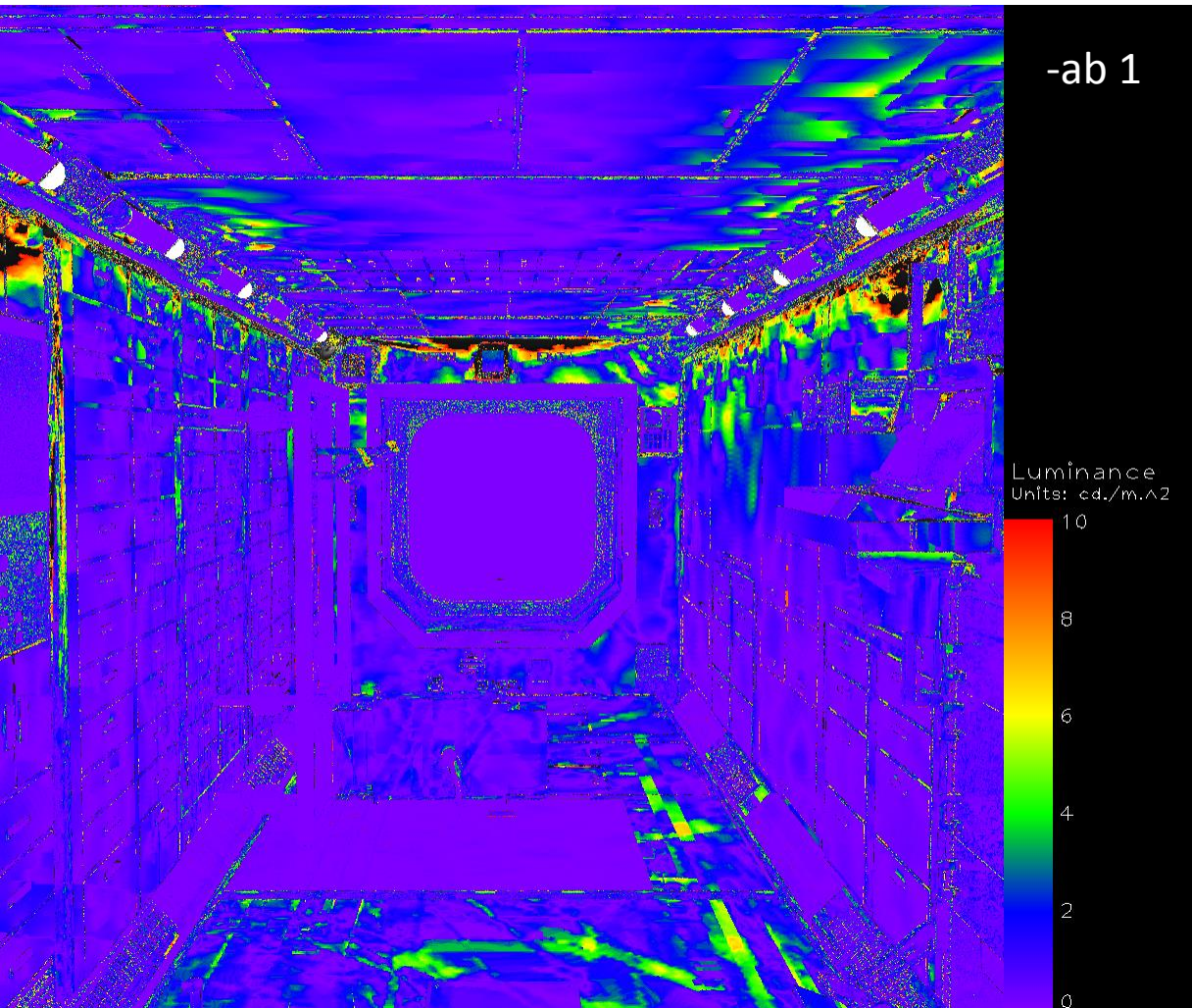


Dynamic RPICT Parameters: -ab 5 -ds 0.1 -st 0.1 -x 1024 -y 1024

Ambient Bounces VS Computation Time for ISS Interior

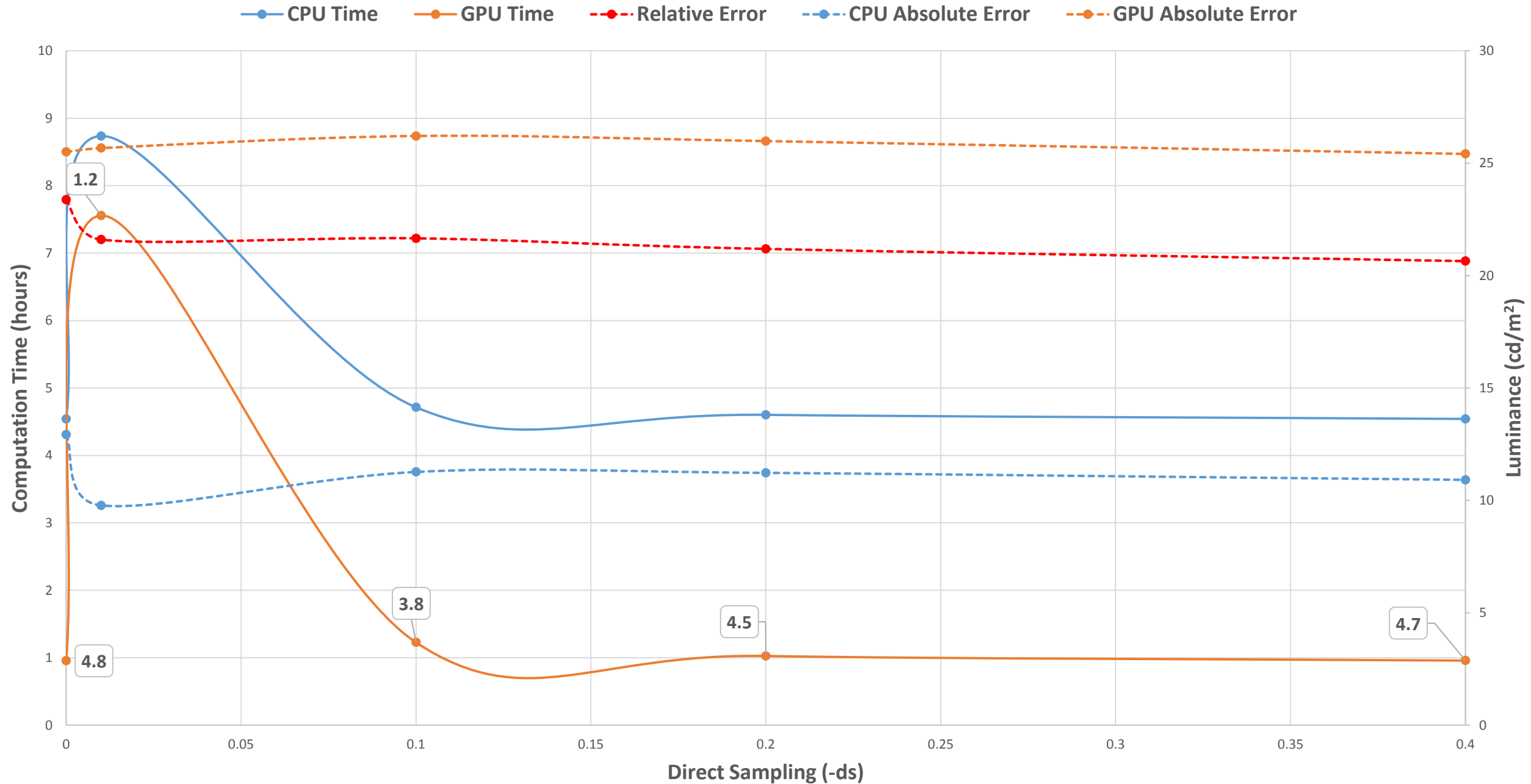


Ambient Bounces -ab

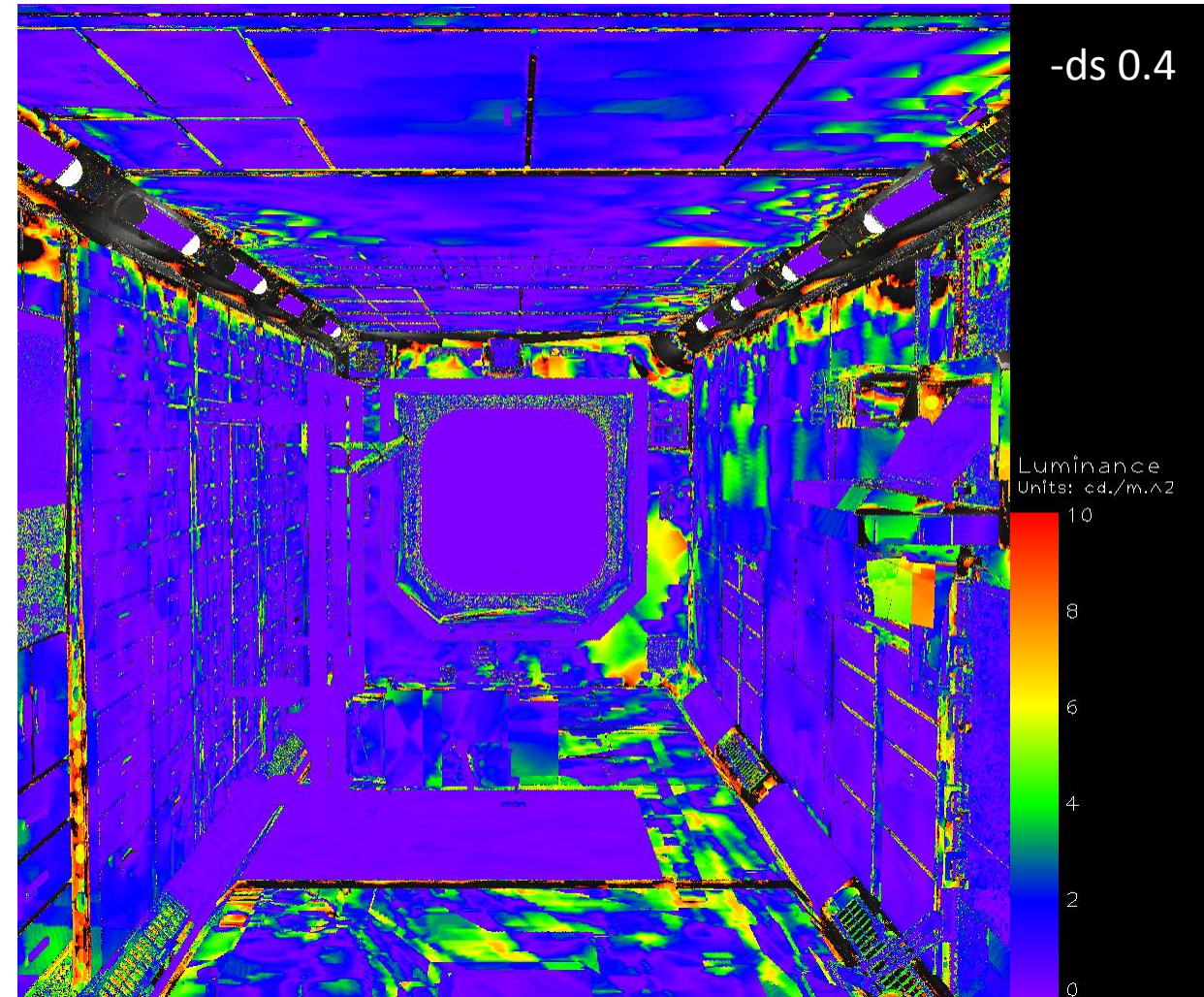
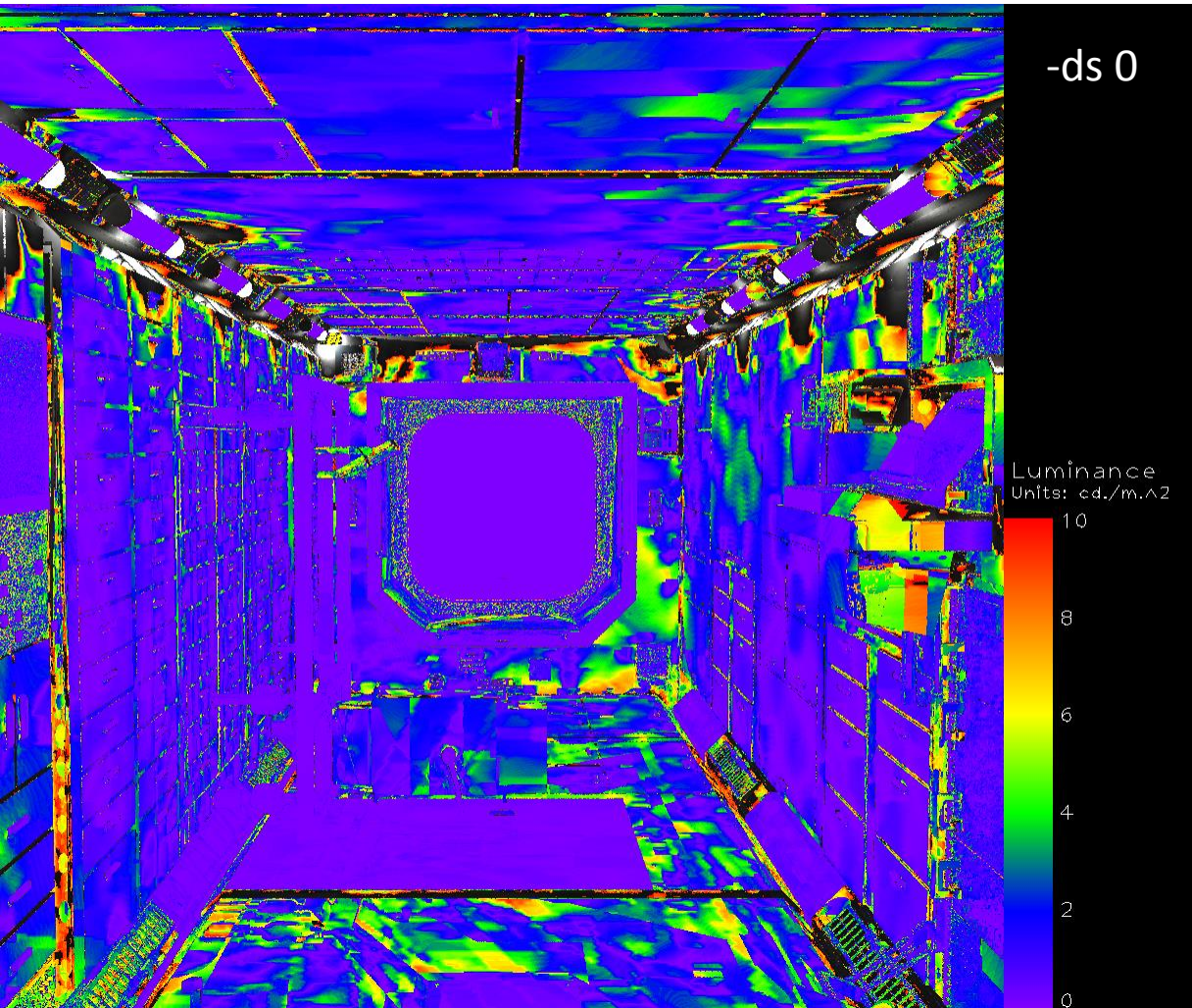


Dynamic RPICT Parameters: -aa 0.1 -ds 0.1 -st 0.1 -x 1024 -y 1024

Direct Sampling VS Computation Time for ISS Interior



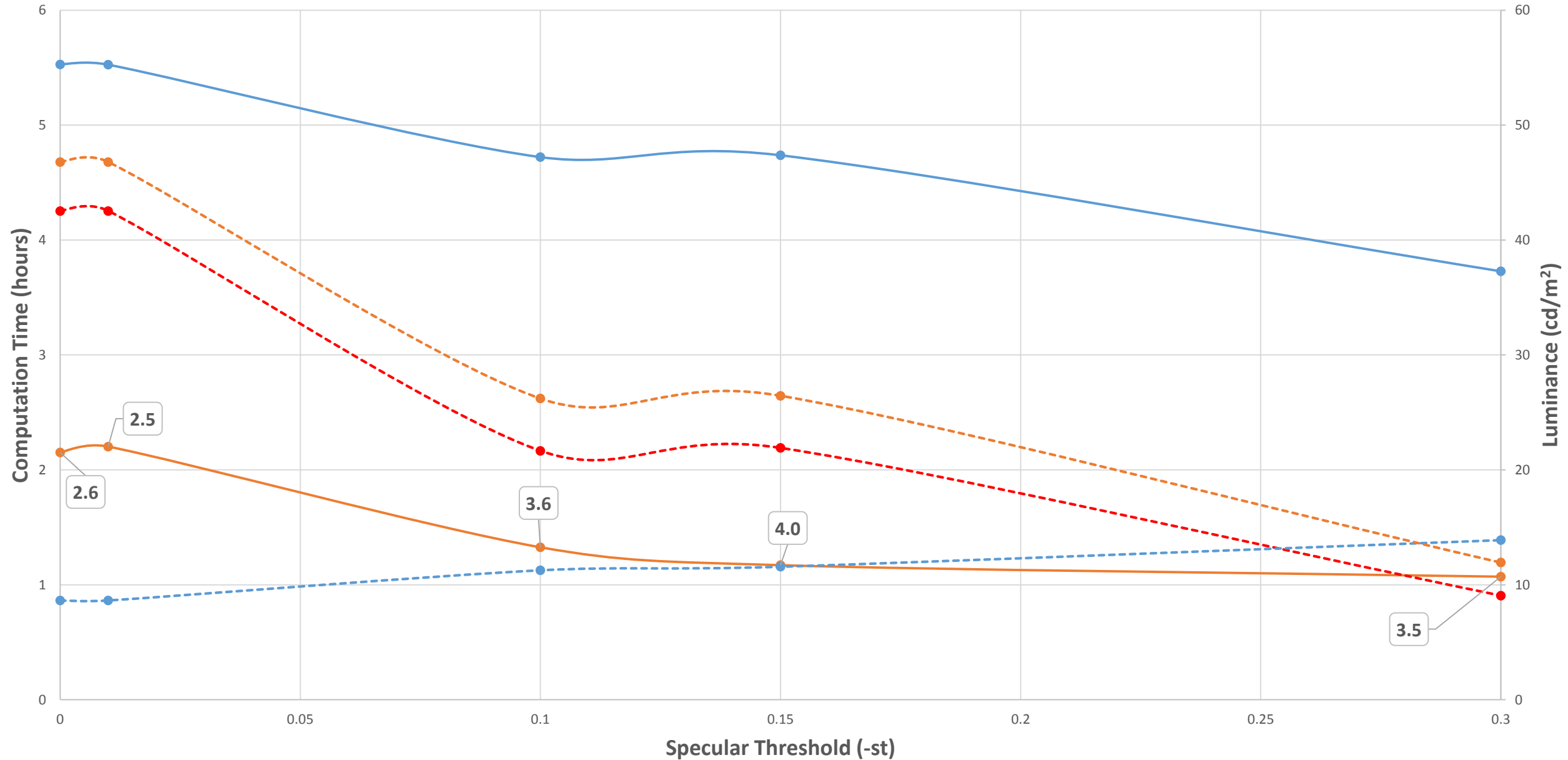
Direct Sampling -ds



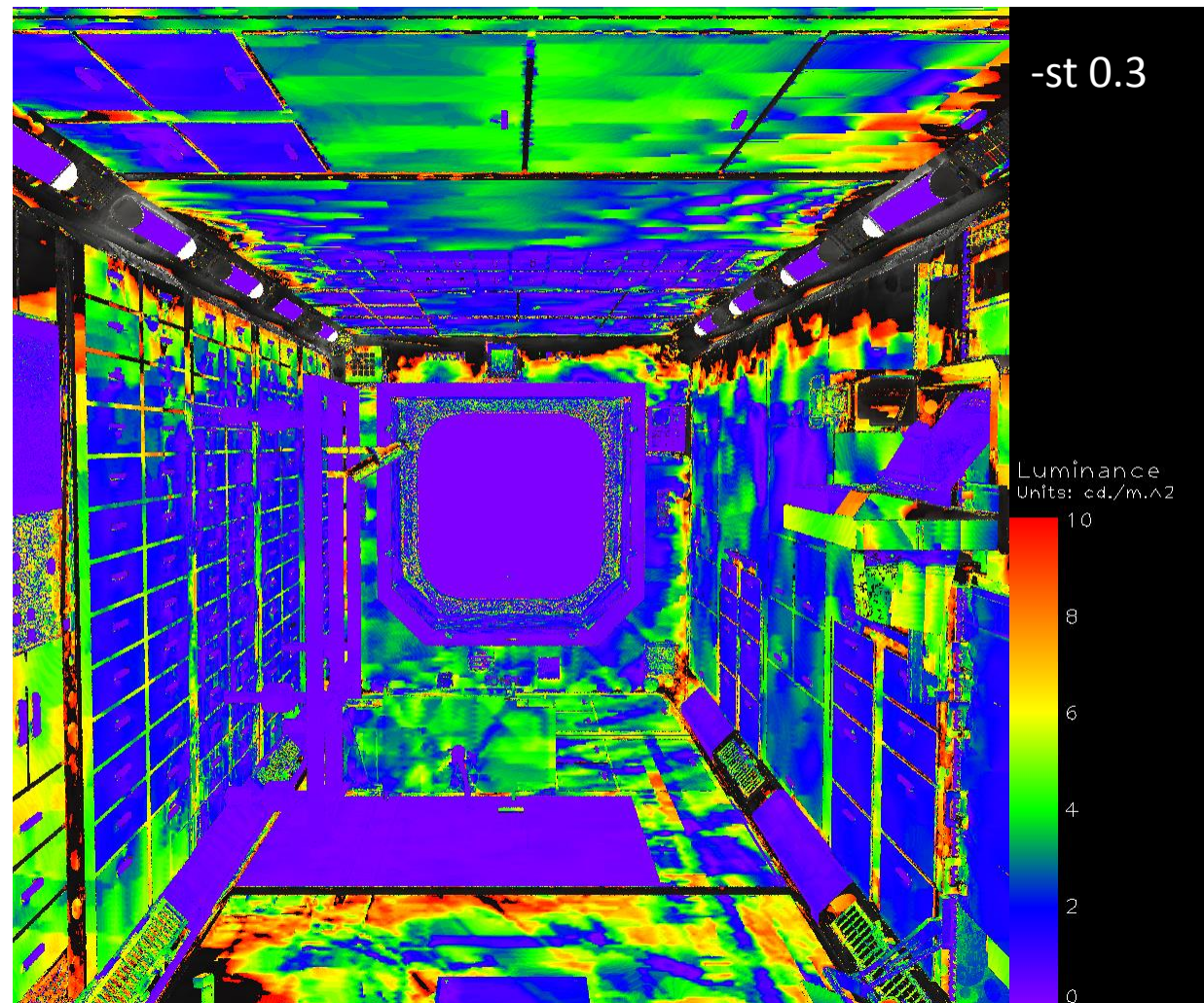
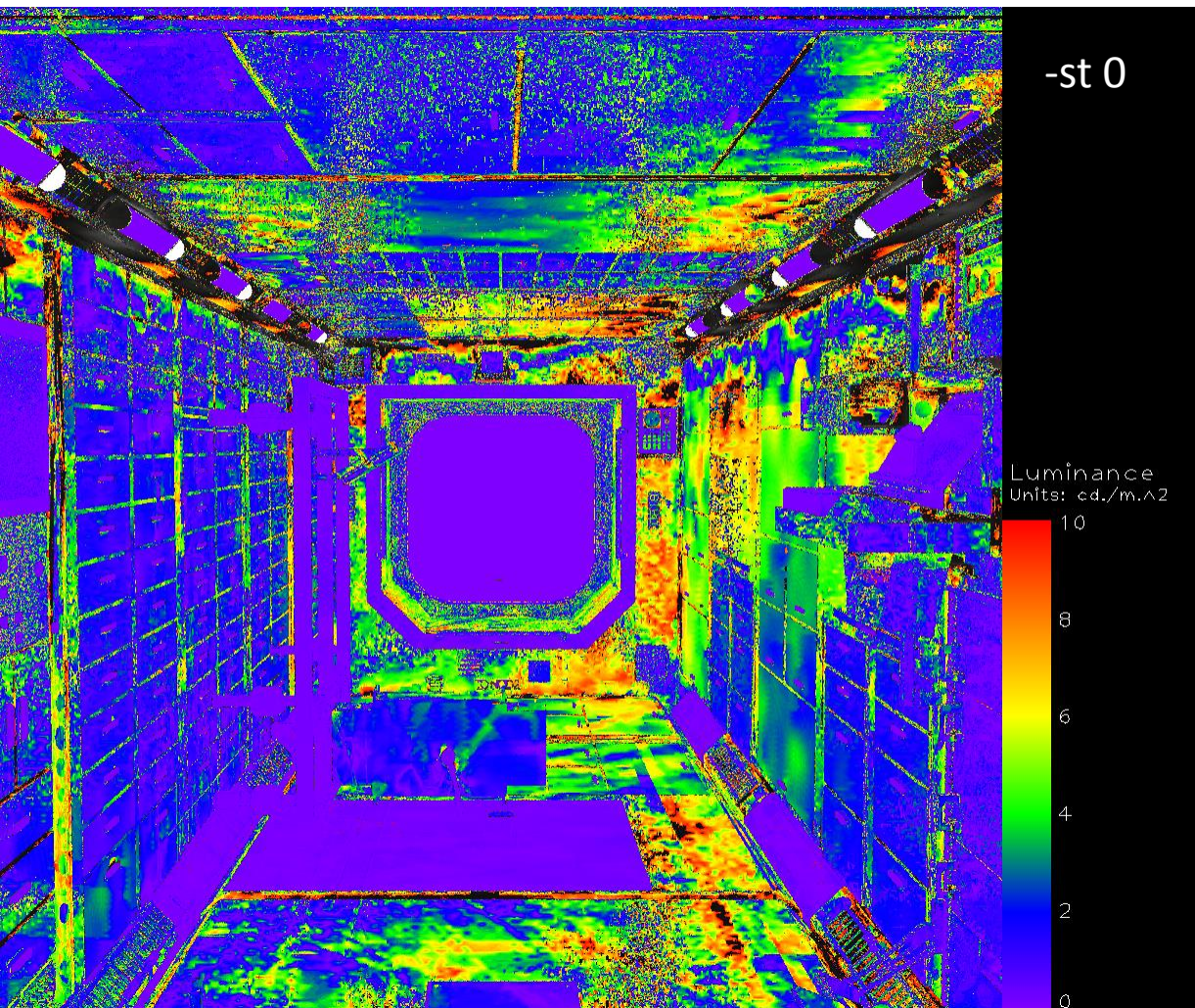
Dynamic RPICT Parameters: -ab 5 -aa 0.1 -st 0.1 -x 1024 -y 1024

Specular Threshold VS Computation Time for ISS Interior

CPU GPU Relative Error Absolute CPU Error Absolute GPU Error



Specular Threshold -st



Dynamic RPICT Parameters: -ab 5 -aa 0.1 -ds 0.1 -x 1024 -y 1024